



Engineering Physics Lab Report 2

Experiment 2: Vector Addition

Mohammed Taher Group No. 3
ID: 1000922832

School of Engineering
Faculty of Engineering, Architecture & Build
Environment
26th of May 2010

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Objective

The purpose of this experiment is to use the force table to experimentally determine the force which balances two other forces. This result is checked by adding the two forces by using their components and by graphically adding the forces.

Learning outcome

Upon the completion of the experiment, the student will be able to

- Determine the force which balance two other forces by experiment
- Could check the experiment result with the methods of components and graphically adding

Apparatus

ME-9447 Force Table, 3 pulleys and pulley clamps, 3 mass hangers, mass set, string, and protractor .

Procedure

1. Place the apparatus on a level table
2. Sketch out the desirable free body diagram
3. Loosen the turning knob of the pulley bracket. Mount the three pulley bracket on the protractor plate.
4. Set the pulley bracket to desirable angel. Tighten the turning knob.
5. Adjust both of the screws at the side of the bracket. Don't over tighten nor loosen the screw, Make sure the pulley can turn smoothly.
6. Place the ring to the center of the protractor.
7. Place the three cords to three pulleys.
8. Place a weight hanger to each of the cord.
9. Place the desirable weights to each of the hanger and observe the movement of the ring.
10. If the rings touch the center rod, this implies that the system is not in equilibrium position.
11. Hang the following masses on two of the two pulleys and clamp the pulleys at the given angles:

$$\text{Force A} = 60\text{g} \text{ at } 0^\circ$$

Force B= 100 g at 120°

Result:

Method	Equilibrant (F_E)	
	Magnitude	Direction (θ)
Experiment	100	264°
Component	87.17	263.4
Graphical	88	264°

Experimental Method:

The result above shows that I had did the experimental method.

Component Method :

$$F_x = 60g - 100g \cos(60^\circ) = 10 \text{ N}$$

$$F_y = 100g \sin (60^\circ) = 86.6 \text{ N}$$

$$F_R = \sqrt{(F_x)^2 + (F_y)^2} = 87.17 \text{ N}$$

$$\tan(\theta) = F_y / F_x \rightarrow \theta = \tan^{-1} 86.6 / 10 \rightarrow 83.4^\circ + 180^\circ = 263.4^\circ$$

Graphical Method:

I will attach a graph shows all the forces and other details.

Discussion

In this experiment I learnt that there are three ways to find the force (F_R) one of them is experimental, component, and graphical and the result of each one of them were approximately same as the other.

Conclusion

To find the remaining force in a graphical method I have to use a ruler and a protractor to measure and know the angle which will be same as the experimental method and the component method.

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